

PATENT ABSTRACTS OF JAPAN

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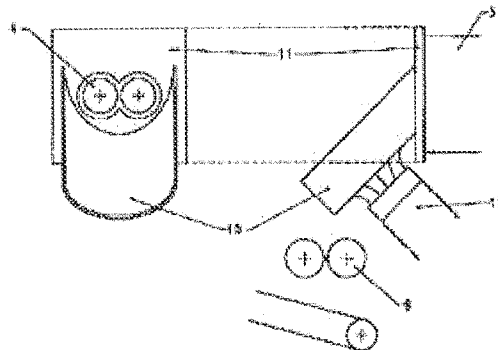
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(54) KNEADING EXTRUDER AND PREPARATION OF TONER USING IT

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a kneading extruder in which an additive of small particles is dispersed uniformly into a binder resin, and a kneaded material is transported smoothly to the next process by connecting a slide-shaped discharge part slanted downward to the outlet of a cylinder part having a kneading transportation member for raw materials in the inside.

SOLUTION: A trough-shaped discharge part 10 is welded to be inclined downward to a mounting stay 11 having an opening of the same shape as the cross section of the opening of a cylinder 3 which is installed in the outlet of the cylinder 3. The inclination is not restricted in particular if it makes a kneaded material transported from the cylinder 3 slip down smoothly and prevents the material from being scattered by impact when the material is inserted between press rollers 9. Appropriate inclination is 30-60°. Surface treatment is applied to the inner surface of the discharge part 10 to improve slippage so that the kneaded material can slip down smoothly without sticking to the surface. The surface is coated preferably by polytetrafluoroethylene.



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CLAIMS

[Claim(s)]

[Claim 1]Mull equipment for launching, wherein a discharge part of the shape of a sliding way which carried out declination of the mull conveyance member for carrying out mull conveyance of said raw material to an exit of a cylinder part which it has inside in mull equipment for launching for carrying out melt kneading of the raw material which consists of binder resin and an additive agent is connected.

[Claim 2]Mull equipment for launching of Claim 1, wherein an opening sectional area of an exit of said cylinder part is the same in an opening sectional area near the center of this cylinder part, and abbreviation.

[Claim 3]Mull equipment for launching of Claim 1, wherein viscosity of said kneaded material in said cylinder exit is below 4×10^4 poise.

[Claim 4]Mull equipment for launching of Claim 1 for which a degree of declination of said discharge part is characterized by an angle from a horizontal direction being 30-60 degrees.

[Claim 5]Mull equipment for launching of Claim 1 for which said discharge part is characterized by carrying out temperature control control of the surface temperatures of this discharge part at 10-30 **.

[Claim 6]Mull equipment for launching of Claim 1, wherein Teflon coating is performed to an inner surface of said discharge part.

[Claim 7]A manufacturing method of a toner manufacturing through a process of mulling binder resin, colorant, and a wax using the mull equipment for launching according to claim 1 to 6 at least.

[Claim 8]- manufacturing method of TONA of Claim 7, wherein appearance melt viscosity at 105 ** of said binder resin is $1 \times 10^4 - 5 \times 10^5$ poise.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the manufacturing method of the mull equipment for launching for carrying out melt kneading of the raw material which consists of binder resin and an additive agent, and the toner using this.

[0002]

[Description of the Prior Art]In order to distribute an additive agent in binder resin, the mull equipment for launching which carries out mixed stirring with an additive agent where it applied heat and melting of the binder resin is carried out is known. For example, mull equipment for launching is used for distributing additive agents, such as colorant and a wax, in binder resin also in the toner used for the development of a latent image in image forming devices, such as a copying machine and a printer.

[0003]A toner is obtained mixing, melt kneading, and by grinding and classifying in raw materials, such as a charge controlling agent, binder resin, colorant, a wax, and if needed. In a mixing step, it is important to distribute colorant, a wax, and a charge controlling agent uniformly in binder resin.

[0004]The schematic view of the mull equipment for launching usually used in the melt kneading process in toner production is shown in drawing 1. The raw material mixed by the mixing process is supplied to the hopper 1, and is supplied in the cylinder 3 with rotation of the feed screw 2. The inside of the cylinder 3 will be heated by 10 ** more than 100, and binder resin, a wax, etc. will be in a molten state among the raw materials supplied in the cylinder 3. The mixture of this molten state has the transportation part 5 conveyed by rotation of the screw 4, and is mull in the mull part 6. At this time, additive agents, such as a wax, are distributed uniformly enough in binder resin. Being cooled, the melt kneading thing has the transportation part 5 conveyed, passes the discharge part 7, and is discharged from the discharge part delivery 8. It is supplied to the cooling press roller 9 as it is, it is thinly extended and cooled by flat shape, and excretions are sent to a crushing step.

[0005]An about seven discharge part [in conventional biaxial type mull equipment for launching] upper surface sectional view is shown in drawing 2. In this case, since cross-section area 8' of the discharge part delivery 8 is more remarkably [than cross-section area 3' of the cylinder 3] small, the kneaded material which exists in the discharge part 7 receives back pressure with the kneaded material conveyed from back. For this reason, in the mull part 6 and the transportation part 5, the wax in a byway and the toner composition distributed uniformly will also be re-condensed with this back pressure, and will become uneven by a major diameter with much trouble.

[0006]The work which prevents it from the toner which carried out melting in contact heat fixing systems, such as hot calender roll fixing, transferring a wax to a fixing upper roller (offset), and carrying out the reattachment to the following transfer paper, It has the work which prevents the inferior transfer of the toner called a middle omission in the transfer method which prevents adherence of the toner to the thickness regulating blade which welds by pressure to a developing

roller in an one-ingredient development system, and regulates the thickness of the developer on a developing roller work and using a roller further. For this reason, it is required to distribute a wax uniformly in a toner, and making the distributed particle diameter of a wax byway-ize with byway-izing of a toner is demanded. If wax particles condense and particle diameter becomes large during toner production, it will become a cause which the isolation wax of the particle diameter same at the time of grinding of kneaded material as a toner is intermingled in a toner, adheres to a photo conductor, and noises, such as BS (black spot (sunspot weld)) and filming, generate on a picture. [0007]In order not to apply back pressure to the kneaded material of discharge part 7 inside, it is possible to remove the discharge part 7 and to discharge kneaded material directly from the cylinder 3. However, in order to correspond to reservation of the translucency in the increase in the coating weight by full-color-izing, and OHP in the latest color toner, low melting point-ization of binder resin is attained, and the viscosity of the kneaded material in cylinder 3 exit is quite low. Therefore, when kneaded material is directly discharged from the cylinder 3, there is a problem that kneaded material will scatter from on the press roller 9 by the shock of fall.

[0008]

[Problem to be solved by the invention]This invention is made in view of the above-mentioned situation. It aims at a wax's providing an additive agent in binder resin, and providing a byway and the manufacturing method of a toner distributed uniformly in a byway, the mull equipment for launching which conveys kneaded material to a next step smoothly while distributing uniformly, and binder resin.

[0009]

[Means for solving problem]To achieve the above objects, the mull equipment for launching of this invention, In the mull equipment for launching for carrying out melt kneading of the raw material which consists of binder resin and an additive agent, it is characterized by connecting the discharge part of the shape of a sliding way which carried out declination of the mull conveyance member for carrying out mull conveyance of said raw material to the exit of the cylinder part which it has inside.

[0010]The manufacturing method of the toner of this invention is characterized by having the process of mulling binder resin, colorant, and a wax using above-mentioned mull equipment for launching at least.

[0011]Since according to this manufacturing method back pressure is not added to kneaded material when discharged from mull equipment for launching, the wax in kneaded material re-condenses and particle diameter does not become large. Therefore, the isolation wax of the particle diameter same at the time of grinding of kneaded material as a toner is intermingled in a toner, adheres to a photo conductor, and noises, such as BS (black spot (sunspot weld)) and filming, do not occur on a picture.

[0012]Since it becomes [whether it was discharged from the cylinder, and] and kneaded material with low viscosity can be smoothly led to a press roller along a sliding way, kneaded material does not scatter on a press roller.

[0013]

[Mode for carrying out the invention]One embodiment of the mull equipment for launching of this invention is described below. The mull equipment for launching of this embodiment replaces the discharge part 7 of the conventional type shown in drawing 2 by the gutter-shaped discharge part 10 which is shown in drawing 3 and which carried out declination.

[0014]The gutter-shaped discharge part 10 is welded in the state where it inclined caudad to the attachment stay 11 which is provided in the exit of the cylinder 3 and has an opening section of the cylinder 3, and an isomorphism-like opening. Especially if a skew ratio is a skew ratio of a grade which does not scatter by a shock when the kneaded material which the kneaded material conveyed from the cylinder 3 is a grade slid down smoothly, and was slid down rushes into the press roller 9, it will not be limited. 30-60 degrees is an appropriate value.

[0015]The surface treatment for sliding on the inner surface of the gutter-shaped discharge part 10, and improving a sex is performed, and kneaded material does not adhere to an inner surface, but it is made to have slid it down smoothly. Teflon coating is preferred although not limited in particular except heat resistance being required.

[0016]In order to keep kneaded material from furthermore adhering, the duct 12 for spraying cooling air on the outside surface of the gutter-shaped discharge part 10 is arranged in the neighborhood, but since the viscosity of kneaded material will become high and it will not rush into the press roller 9 smoothly if it cools too much not much, it is necessary to carry out temperature control to optimal temperature. It is desirable to keep the surface temperatures of the gutter-shaped discharge part 10 at 10-30 ** in the state where kneaded material is made to discharge. It may be made to cool a cooling method by constructing piping on the outside surface of not only cooling air but the gutter-shaped discharge part 10, and letting water pass in it.

[0017]The section of the gutter-shaped discharge part 10 is a semicircle, and is set as the path which is a grade which can cover the opening of the attachment stay 11. The path of the gutter-shaped discharge part 10 will not be limited if the kneaded material conveyed from the cylinder 3 is a grade which is not overflowed to the exterior of the gutter-shaped discharge part 10.

[0018]Since it will become a lump at the exit of the cylinder 3 and will not flow through the gutter-shaped discharge part 10 as **** as kneaded material if viscosity is too high not much, it is necessary to be the viscosity of the flowing grade. It is required for the melt viscosity in cylinder 3 exit to be below 4×10^4 poise, and it is below 1×10^4 poise preferably.

[0019]As raw material of the toner mullied using the kneading apparatus of this invention, That whose appearance melt viscosity at 105 ** is a $1 \times 10^4 - 5 \times 10^5$ poise grade as binder resin used for this is desirable, and it is suitable when mulling the raw material of the full color toner especially using binder resin of a low melting point.

[0020]Although form of the discharge part was made gutter-shaped in the above-mentioned embodiment, it may be made the shape of a square groove as shown not only in this but in drawing 4. It may be made the form which a top cover is attached to and kneaded material is not further easily full of as shown in the figure.

[0021]

[Working example]First, in order to obtain the mixture of the raw material of a toner fed into mull equipment for launching, Polyester resin (temperature of 105 ** in case appearance melt viscosity is 1×10^5 poise, temperature of 95 ** in case appearance melt viscosity is 1×10^6 poise), and a magenta coloring agent (Dainippon Ink & Chemicals [, Inc.] make: C.I. pigment red 184). It taught the pressurized kneader at a rate of 7:3, these were mullied, the feather mill ground this kneaded material, and the pigment master batch was obtained. In asking for the melt viscosity of resin, it measured using the flow tester (Shimadzu [Corp.] make: CFT-500). Carry out weighing of 1.0 g of the samples to measure, and using a nozzle with a 1.0 mm[in diameter] phix length of 1.0 mm on 30 kg of loads, and the conditions of 60-140 ** of measurement temperature requirements for the heating rate of 3.0 ** / min, and preheating time 180 seconds. It measured with the above-mentioned flow tester, and asked from the temperature-apparent-viscosity curve in the above-mentioned sample.

[0022]Ten weight sections and the above-mentioned polyester resin for this pigment master batch And 93 weight sections, The amount part of duplexs and softening temperature mixed the wax which consists of polypropylene (Sanyo Chemical Industries [, Ltd.] make: screw call 110TS) of 3.5 the charge controlling agent which consists of a salicylic acid zinc complex (Orient chemical-industry company make: E-84) at a rate of the amount part of duplexs, and 140 ** and acid value mixed these with the Henschel mixer.

[0023]It mullied by supplying to the mull equipment for launching which replaced the discharge part 7 in the conventional mull equipment for launching which shows drawing 2 the obtained mixture by the

gutter-shaped discharge part 10 which is shown in drawing 3, and which carried out declination.

[0024]The gutter-shaped discharge part 10 is welded after 45 degrees has inclined caudad to the attachment stay 11 which is provided in the exit of the cylinder 3 and has an opening section of the cylinder 3, and an isomorphism-like opening.

[0025]In order for kneaded material not to adhere to the inner surface of the gutter-shaped discharge part 10 but to make it slide down smoothly, While Teflon coating (Japanese fluorine company make NF-820TFC) is performed to the inner surface of the gutter-shaped discharge part 10, the duct 12 for spraying cooling air near the outside surface of the gutter-shaped discharge part 10 is formed, and temperature control control is carried out so that surface temperatures may be 20 **.

[0026]In order to keep kneaded material from overflowing to the exterior of the gutter-shaped discharge part 10, a path of the gutter-shaped discharge part 10 is set up to such an extent that an opening of the attachment stay 11 can be covered. While inside of the cylinder 3 is conveyed, melt kneading of the mixture fed into mull equipment for launching is carried out, and a wax etc. are uniformly distributed in resin. Although kneaded material which arrived at an exit of the cylinder 3 is discharged on the gutter-shaped discharge part 10, since a discharge part is not narrowed down to a taper like before, a wax once distributed by homogeneity in resin does not re-condense it.

[0027]Melt viscosity at that time is about 5×10^3 , and about 135 ** of temperature of kneaded material in cylinder 3 exit is viscosity with a low grade which slides down the inclined gutter-shaped discharge part 10 enough. Since the discharge part 10 is cooled by optimal temperature with the cooling air duct 12, kneaded material does not adhere to an inner surface of the gutter-shaped discharge part 10. Then, it is cooled, being rolled by the press roller 9.

[0028]In order to measure the dispersibility of a wax in obtained kneaded material, it dissolved in chloroform and kneaded material was centrifuged. And waxes which have floated were collected and the dispersion state was photoed using an electron microscope. The photograph is shown in drawing 5.

[0029]The photograph of the dispersion state of the wax of the kneaded material obtained as a comparative example using the conventional mull equipment for launching shown in drawing 2 is shown in drawing 6. The experimental method is the same as that of an above-mentioned method except using the mull equipment for launching of drawing 2.

[0030]When the photograph of drawing 5 and drawing 6 is compared, it turns out that the wax is finely distributed for the direction which used the mull equipment for launching of this invention so that clearly. Therefore, according to the mull equipment for launching of this invention, the isolation wax of particle diameter comparable as a toner at the time of grinding of kneaded material is intermingled in a toner, adheres to a photo conductor, and noises, such as BS (black spot (sunspot weld)) and filming, do not occur on a picture.

[0031]

[Effect of the Invention]Since back pressure is not added to kneaded material in the mull equipment for launching in this invention when discharging kneaded material from a cylinder as explained in full detail above, the wax currently distributed in resin does not re-condense. Therefore, the wax is finely distributed uniformly in resin and it follows, The isolation wax of particle diameter comparable as a toner at the time of grinding of kneaded material is intermingled in a toner, adheres to a photo conductor, and noises, such as BS (black spot (sunspot weld)) and filming, do not occur on a picture.

[0032]Since it becomes [whether it was discharged from the cylinder, and] and kneaded material with low viscosity can be smoothly led to a press roller along a sliding way, kneaded material does not scatter on a press roller.

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TECHNICAL FIELD

[Field of the Invention]This invention relates to the manufacturing method of the mull equipment for launching for carrying out melt kneading of the raw material which consists of binder resin and an additive agent, and the toner using this.

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PRIOR ART

[Description of the Prior Art]In order to distribute an additive agent in binder resin, the mull equipment for launching which carries out mixed stirring with an additive agent where it applied heat and melting of the binder resin is carried out is known. For example, mull equipment for launching is used for distributing additive agents, such as colorant and a wax, in binder resin also in the toner used for the development of a latent image in image forming devices, such as a copying machine and a printer.

[0003]A toner is obtained mixing, melt kneading, and by grinding and classifying in raw materials, such as a charge controlling agent, binder resin, colorant, a wax, and if needed. In a mixing step, it is important to distribute colorant, a wax, and a charge controlling agent uniformly in binder resin.

[0004]The schematic view of the mull equipment for launching usually used in the melt kneading process in toner production is shown in drawing 1. The raw material mixed by the mixing process is supplied to the hopper 1, and is supplied in the cylinder 3 with rotation of the feed screw 2. The inside of the cylinder 3 will be heated by 10 ** more than 100, and binder resin, a wax, etc. will be in a molten state among the raw materials supplied in the cylinder 3. The mixture of this molten state has the transportation part 5 conveyed by rotation of the screw 4, and is mull in the mull part 6. At this time, additive agents, such as a wax, are distributed uniformly enough in binder resin. Being cooled, the melt kneading thing has the transportation part 5 conveyed, passes the discharge part 7, and is discharged from the discharge part delivery 8. It is supplied to the cooling press roller 9 as it is, it is thinly extended and cooled by flat shape, and excretions are sent to a crushing step.

[0005]An about seven discharge part [in conventional biaxial type mull equipment for launching] upper surface sectional view is shown in drawing 2. In this case, since cross-section area 8' of the discharge part delivery 8 is more remarkably [than cross-section area 3' of the cylinder 3] small, the kneaded material which exists in the discharge part 7 receives back pressure with the kneaded material conveyed from back. For this reason, in the mull part 6 and the transportation part 5, the wax in a byway and the toner composition distributed uniformly will also be re-condensed with this back pressure, and will become uneven by a major diameter with much trouble.

[0006]The work which prevents it from the toner which carried out melting in contact heat fixing systems, such as hot calender roll fixing, transferring a wax to a fixing upper roller (offset), and carrying out the reattachment to the following transfer paper, It has the work which prevents the inferior transfer of the toner called a middle omission in the transfer method which prevents adherence of the toner to the thickness regulating blade which welds by pressure to a developing roller in an one-ingredient development system, and regulates the thickness of the developer on a developing roller work and using a roller further. For this reason, it is required to distribute a wax uniformly in a toner, and making the distributed particle diameter of a wax byway-ize with byway-izing of a toner is demanded. If wax particles condense and particle diameter becomes large during toner production, it will become a cause which the isolation wax of the particle diameter same at the time of grinding of kneaded material as a toner is intermingled in a toner, adheres to a photo

conductor, and noises, such as BS (black spot (sunspot weld)) and filming, generate on a picture. [0007] In order not to apply back pressure to the kneaded material of discharge part 7 inside, it is possible to remove the discharge part 7 and to discharge kneaded material directly from the cylinder 3. However, in order to correspond to reservation of the translucency in the increase in the coating weight by full-color-izing, and OHP in the latest color toner, low melting point-ization of binder resin is attained, and the viscosity of the kneaded material in cylinder 3 exit is quite low. Therefore, when kneaded material is directly discharged from the cylinder 3, there is a problem that kneaded material will scatter from on the press roller 9 by the shock of fall.

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EFFECT OF THE INVENTION

[Effect of the Invention]Since back pressure is not added to kneaded material in the mull equipment for launching in this invention when discharging kneaded material from a cylinder as explained in full detail above, the wax currently distributed in resin does not re-condense. Therefore, the wax is finely distributed uniformly in resin and it follows, The isolation wax of particle diameter comparable as a toner at the time of grinding of kneaded material is intermingled in a toner, adheres to a photo conductor, and noises, such as BS (black spot (sunspot weld)) and filming, do not occur on a picture.

[0032]Since it becomes [whether it was discharged from the cylinder, and] and kneaded material with low viscosity can be smoothly led to a press roller along a sliding way, kneaded material does not scatter on a press roller.

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TECHNICAL PROBLEM

[Problem to be solved by the invention]This invention is made in view of the above-mentioned situation, It aims at a wax's providing an additive agent in binder resin, and providing a byway and the manufacturing method of a toner distributed uniformly in a byway, the mull equipment for launching which conveys kneaded material to a next step smoothly while distributing uniformly, and binder resin.

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MEANS

[Means for solving problem]To achieve the above objects, the mull equipment for launching of this invention, In the mull equipment for launching for carrying out melt kneading of the raw material which consists of binder resin and an additive agent, it is characterized by connecting the discharge part of the shape of a sliding way which carried out declination of the mull conveyance member for carrying out mull conveyance of said raw material to the exit of the cylinder part which it has inside.

[0010]The manufacturing method of the toner of this invention is characterized by having the process of mulling binder resin, colorant, and a wax using above-mentioned mull equipment for launching at least.

[0011]Since according to this manufacturing method back pressure is not added to kneaded material when discharged from mull equipment for launching, the wax in kneaded material re-condenses and particle diameter does not become large. Therefore, the isolation wax of the particle diameter same at the time of grinding of kneaded material as a toner is intermingled in a toner, adheres to a photo conductor, and noises, such as BS (black spot (sunspot weld)) and filming, do not occur on a picture.

[0012]Since it becomes [whether it was discharged from the cylinder, and] and kneaded material with low viscosity can be smoothly led to a press roller along a sliding way, kneaded material does not scatter on a press roller.

[0013]

[Mode for carrying out the invention]One embodiment of the mull equipment for launching of this invention is described below. The mull equipment for launching of this embodiment replaces the discharge part 7 of the conventional type shown in drawing 2 by the gutter-shaped discharge part 10 which is shown in drawing 3 and which carried out declination.

[0014]The gutter-shaped discharge part 10 is welded in the state where it inclined caudad to the attachment stay 11 which is provided in the exit of the cylinder 3 and has an opening section of the cylinder 3, and an isomorphism-like opening. Especially if a skew ratio is a skew ratio of a grade which does not scatter by a shock when the kneaded material which the kneaded material conveyed from the cylinder 3 is a grade slid down smoothly, and was slid down rushes into the press roller 9, it will not be limited. 30-60 degrees is an appropriate value.

[0015]The surface treatment for sliding on the inner surface of the gutter-shaped discharge part 10, and improving a sex is performed, and kneaded material does not adhere to an inner surface, but it is made to have slid it down smoothly. Teflon coating is preferred although not limited in particular except heat resistance being required.

[0016]In order to keep kneaded material from furthermore adhering, the duct 12 for spraying cooling air on an outside surface of the gutter-shaped discharge part 10 is arranged in the neighborhood, but since viscosity of kneaded material will become high and it will not rush into the press roller 9 smoothly if it cools too much not much, it is necessary to carry out temperature control to optimal

temperature. It is desirable to keep surface temperatures of the gutter-shaped discharge part 10 at 10-30 °C in the state where kneaded material is made to discharge. It may be made to cool a cooling method by constructing piping on an outside surface of not only cooling air but the gutter-shaped discharge part 10, and letting water pass in it.

[0017] A section of the gutter-shaped discharge part 10 is a semicircle, and is set as a path which is a grade which can cover an opening of the attachment stay 11. A path of the gutter-shaped discharge part 10 will not be limited if kneaded material conveyed from the cylinder 3 is a grade which is not overflowed to the exterior of the gutter-shaped discharge part 10.

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[0019] As raw material of the toner milled using the kneading apparatus of this invention, That whose appearance melt viscosity at 105 °C is a $1 \times 10^4 - 5 \times 10^5$ poise grade as binder resin used for this is desirable, and it is suitable when mulling the raw material of the full color toner especially using binder resin of a low melting point.

[0020] Although form of the discharge part was made gutter-shaped in the above-mentioned embodiment, it may be made the shape of a square groove as shown not only in this but in drawing 4. It may be made the form which a top cover is attached to and kneaded material is not further easily full of as shown in the figure.

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EXAMPLE

[Working example]First, in order to obtain a mixture of raw material of a toner fed into mull equipment for launching, Polyester resin (temperature of 105 ** in case appearance melt viscosity is 1×10^5 poise, temperature of 95 ** in case appearance melt viscosity is 1×10^6 poise), and a magenta coloring agent (Dainippon Ink & Chemicals [, Inc.] make: C.I. pigment red 184). It taught a pressurized kneader at a rate of 7:3, these were mull, a feather mill ground this kneaded material, and a pigment master batch was obtained. In asking for melt viscosity of resin, it measured using a flow tester (Shimadzu [Corp.] make: CFT-500). Carry out weighing of 1.0 g of the samples to measure, and using a nozzle with a 1.0 mm[in diameter] phix length of 1.0 mm on 30 kg of loads, and conditions of 60-140 ** of measurement temperature requirements for a heating rate of 3.0 ** / min, and preheating time 180 seconds. It measured with the above-mentioned flow tester, and asked from a temperature-apparent-viscosity curve in the above-mentioned sample.

[0022]Ten weight sections and the above-mentioned polyester resin for this pigment master batch And 93 weight sections, The amount part of duplexs and softening temperature mixed a wax which consists of polypropylene (Sanyo Chemical Industries [, Ltd.] make: screw call 110TS) of 3.5 a charge controlling agent which consists of a salicylic acid zinc complex (Orient chemical-industry company make: E-84) at a rate of the amount part of duplexs, and 140 ** and acid value mixed these with a Henschel mixer.

[0023]It mull by supplying to the mull equipment for launching which replaced the discharge part 7 in the conventional mull equipment for launching which shows drawing 2 the obtained mixture by the gutter-shaped discharge part 10 which is shown in drawing 3, and which carried out declination.

[0024]The gutter-shaped discharge part 10 is welded after 45 degrees has inclined caudad to the attachment stay 11 which is provided in the exit of the cylinder 3 and has an opening section of the cylinder 3, and an isomorphism-like opening.

[0025]In order for kneaded material not to adhere to the inner surface of the gutter-shaped discharge part 10 but to make it slide down smoothly, While Teflon coating (Japanese fluorine company make NF-820TFC) is performed to the inner surface of the gutter-shaped discharge part 10, the duct 12 for spraying cooling air near the outside surface of the gutter-shaped discharge part 10 is formed, and temperature control control is carried out so that surface temperatures may be 20 **.

[0026]In order to keep kneaded material from overflowing to the exterior of the gutter-shaped discharge part 10, the path of the gutter-shaped discharge part 10 is set up to such an extent that the opening of the attachment stay 11 can be covered. While the inside of the cylinder 3 is conveyed, melt kneading of the mixture fed into mull equipment for launching is carried out, and a wax etc. are uniformly distributed in resin. Although the kneaded material which arrived at the exit of the cylinder 3 is discharged on the gutter-shaped discharge part 10, since the discharge part is not narrowed down to a taper like before, the wax once distributed by homogeneity in resin does not re-condense it.

[0027]The melt viscosity at that time is about 5×10^3 , and about 135 °C of temperature of the kneaded material in cylinder 3 exit is viscosity with a low grade which slides down the inclined gutter-shaped discharge part 10 enough. Since the discharge part 10 is cooled by optimal temperature with the cooling air duct 12, kneaded material does not adhere to the inner surface of the gutter-shaped discharge part 10. Then, it is cooled, being rolled by the press roller 9.

[0028]In order to measure the dispersibility of the wax in the obtained kneaded material, it dissolved in chloroform and kneaded material was centrifuged. And the waxes which have floated were collected and the dispersion state was photoed using the electron microscope. The photograph is shown in drawing 5.

[0029]A photograph of a dispersion state of a wax of kneaded material obtained as a comparative example using the conventional mull equipment for launching shown in drawing 2 is shown in drawing 6. An experimental method is the same as that of an above-mentioned method except using mull equipment for launching of drawing 2.

[0030]When a photograph of drawing 5 and drawing 6 is compared, it turns out that a wax is finely distributed for a direction which used mull equipment for launching of this invention so that clearly. Therefore, according to mull equipment for launching of this invention, an isolation wax of particle diameter comparable as a toner at the time of grinding of kneaded material is intermingled in a toner, adheres to a photo conductor, and noises, such as BS (black spot (sunspot weld)) and filming, do not occur on a picture.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The schematic view of conventional mull equipment for launching is shown.

[Drawing 2]The upper surface sectional view near the discharge part of conventional biaxial mull equipment for launching is shown.

[Drawing 3]One embodiment of the mull equipment for launching of this invention is shown.

[Drawing 4]Other embodiments of the mull equipment for launching of this invention are shown.

[Drawing 5]The electron microscope photograph (SEM photograph) of the dispersion state of the wax in the toner kneaded material obtained with the mull equipment for launching of this invention is shown.

[Drawing 6]The electron microscope photograph (SEM photograph) of the dispersion state of the wax in the toner kneaded material obtained with conventional mull equipment for launching is shown.

[Explanations of letters or numerals]

3: A cylinder, 7:discharge part, a 10:gutter-shaped discharge part, 12 : cooling air duct

[Translation done.]

* NOTICES *

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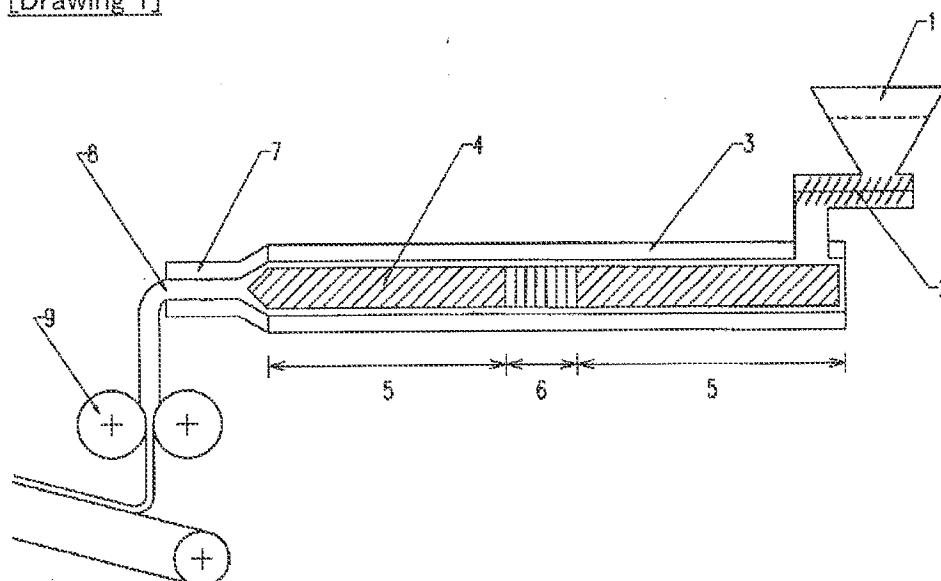
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2.*** shows the word which can not be translated.

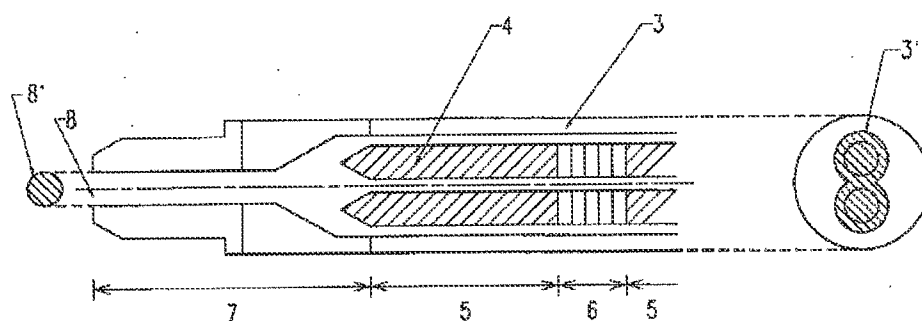
3.In the drawings, any words are not translated.

DRAWINGS

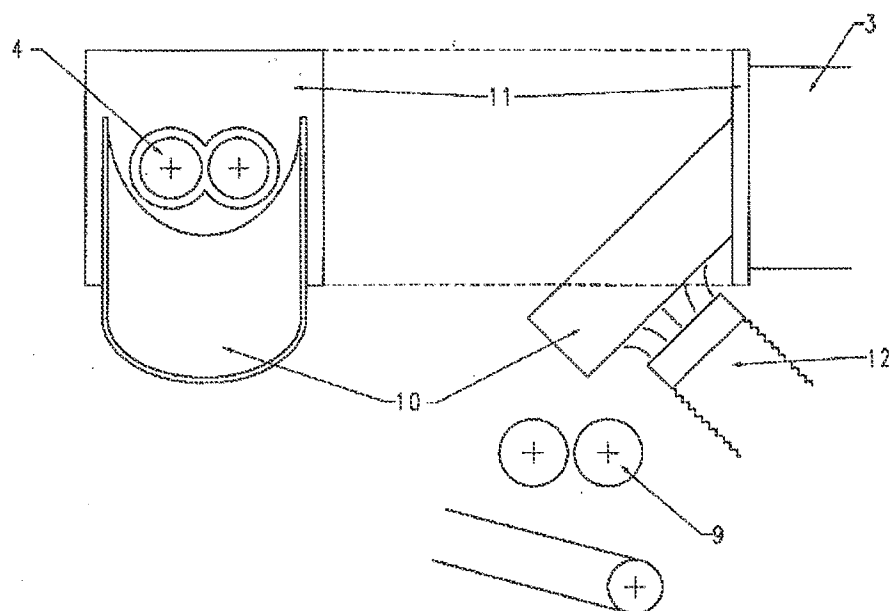
[Drawing 1]



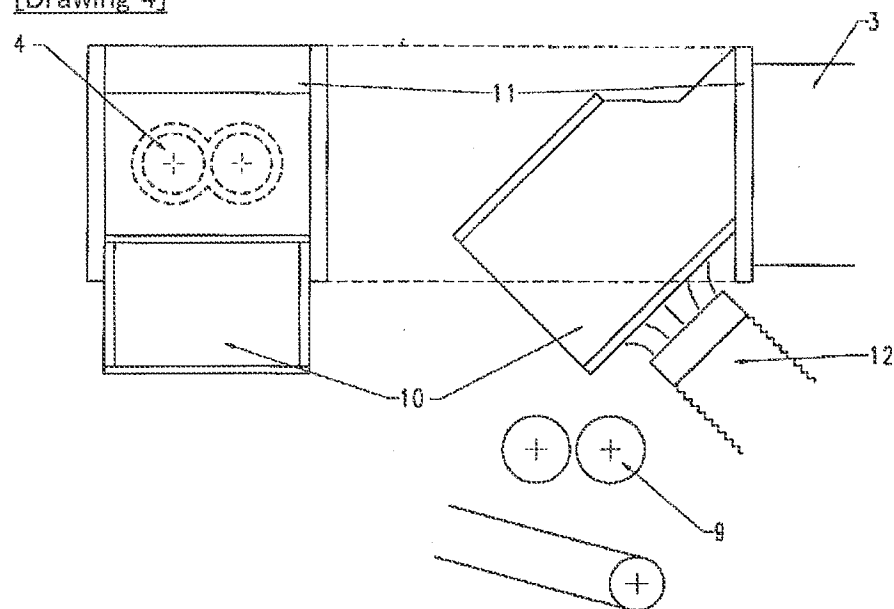
[Drawing 2]



[Drawing 3]

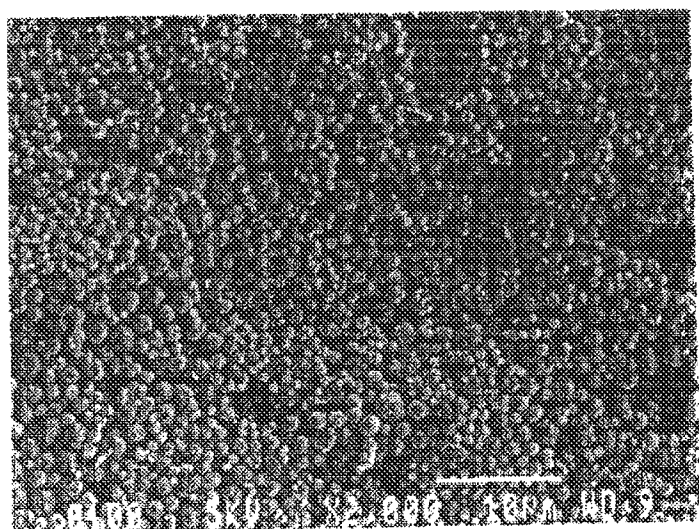


[Drawing 4]



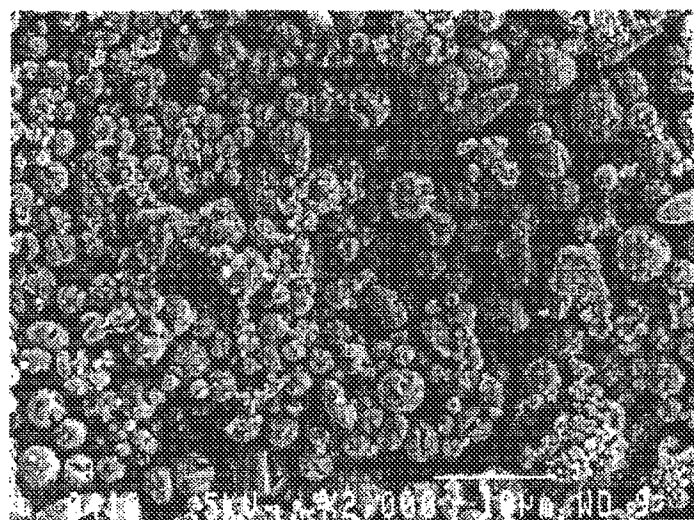
[Drawing 5]

図面代用写真



[Drawing 6]

図面代用写真



[Translation done.]

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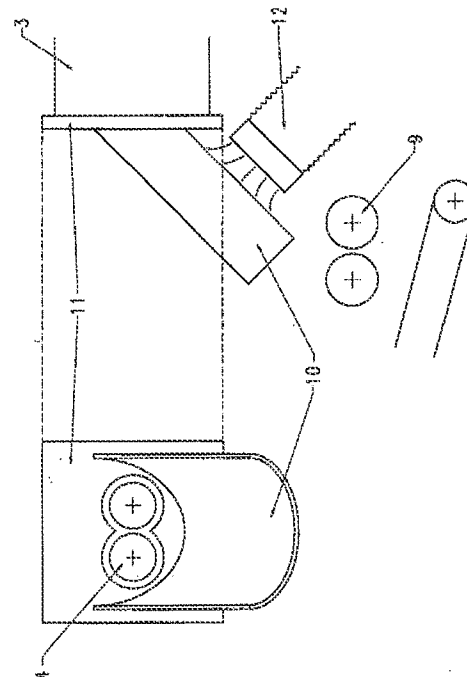
国際ビル ミノルタ株式会社内

(54) 【発明の名称】 混練押出装置及びこれを用いたトナーの製造方法

(57) 【要約】

【課題】 バインダー樹脂中に添加剤を小径かつ均一に分散するとともに混練物をスムーズにプレスローラに搬送する混練押出装置及びこれを用いたトナーの製造方法を提供すること。

【解決手段】 混練押出装置のシリンダー部3の出口に下方傾斜した滑り台状の排出部10を設ける。



【特許請求の範囲】

【請求項1】 バインダー樹脂と添加剤とからなる原材料を熔融混練するための混練押出装置において、前記原材料を混練搬送するための混練搬送部材を内部に有するシリンダー部の出口に下方傾斜した滑り台状の排出部が連接されていることを特徴とする混練押出装置。

【請求項2】 前記シリンダー部の出口の開口断面積は該シリンダー部の中央付近の開口断面積と略同一であることを特徴とする請求項1の混練押出装置。

【請求項3】 前記シリンダー出口での前記混練物の粘度が 4×10^4 poise以下であることを特徴とする請求項1の混練押出装置。

【請求項4】 前記排出部の下方傾斜の度合いは、水平方向からの角度が $30 \sim 60^\circ$ であることを特徴とする請求項1の混練押出装置。

【請求項5】 前記排出部は該排出部の外面温度が $10 \sim 30^\circ\text{C}$ に温調制御されていることを特徴とする請求項1の混練押出装置。

【請求項6】 前記排出部の内面にテフロンコーティングが施されていることを特徴とする請求項1の混練押出装置。

【請求項7】 少なくともバインダー樹脂、着色剤及びワックスを請求項1乃至6記載の混練押出装置を用いて混練する工程を経て製造されることを特徴とするトナーの製造方法。

【請求項8】 前記バインダー樹脂の 105°C における見掛け粘度が $1 \times 10^4 \sim 5 \times 10^5$ poiseであることを特徴とする請求項7のトナーの製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、バインダー樹脂と添加剤とからなる原材料を熔融混練するための混練押出装置及びこれを用いたトナーの製造方法に関する。

【0002】

【従来の技術】バインダー樹脂中に添加剤を分散させるために、熱を加えバインダー樹脂を熔融させた状態で添加剤と混合攪拌する混練押出装置が知られている。例えば、複写機やプリンター等の画像形成装置において潜像の現像に用いられるトナーにおいても、バインダー樹脂中に着色剤及びワックス等の添加剤を分散するのに混練押出装置が用いられている。

【0003】トナーは、バインダー樹脂、着色剤、ワックス及び必要に応じて荷電制御剤等の原材料を、混合、熔融混練、粉碎、分級することにより得られる。混練工程においては、着色剤、ワックス及び荷電制御剤をバインダー樹脂中に均一に分散させることが重要である。

【0004】トナー製造における熔融混練工程において通常用いられる混練押出装置の概略図を図1に示す。混合工程で混合された原材料がホッパー1に投入されており、供給スクリー2の回転に伴いシリンダー3内に供

給される。シリンダー3内は百数十 $^\circ\text{C}$ に熱せられており、シリンダー3内に供給された原材料のうちバインダー樹脂やワックス等は熔融状態となる。この熔融状態の混合物はスクリー4の回転により搬送部5を搬送されていき混練部6で混練される。この時、ワックス等の添加剤がバインダー樹脂中に十分均一に分散される。熔融混練物は冷却されつつ搬送部5を搬送されていき、排出部7を通過し排出部吐出口8から排出される。排出物はそのまま冷却プレスローラ9に投入され、薄く扁平状に引き延ばされ、冷却されて粉碎工程に送られる。

【0005】従来の2軸型の混練押出装置における排出部7近傍の上面断面図を図2に示す。この場合、排出部吐出口8の断面積8'はシリンダー3の断面積3'よりも著しく小さいので、排出部7内に存在する混練物は後ろから搬送されてくる混練物によって背圧を受ける。このため、混練部6及び搬送部5においてせっかく小径かつ均一に分散されたトナー組成中のワックスもこの背圧により再凝集してしまい、大径で不均一になってしま

う。

【0006】ワックスは、熱ロール定着等の接触加熱定着方式においては熔融したトナーが定着上ローラに転移（オフセット）し次の転写紙に再付着することを防止する働き、1成分現像方式においては現像ローラに圧接して現像ローラ上の現像剤の層厚を規制する層厚規制ブレードへのトナーの固着を防止する働き、さらにローラを用いる転写方式においては中抜けと呼ばれるトナーの転写不良を防止する働きをもっている。このため、ワックスをトナー中に均一に分散させることが必要であり、トナーの小径化に伴いワックスの分散粒径を小径化させることが要求されている。トナー製造中にワックス粒子が凝集して粒径が大きくなると、混練物の粉碎時にトナーと同様の粒径の遊離ワックスがトナー中に混在してしまい、感光体に付着して画像上にBS（ブラックスポット（黒点融着））及びフィルミング等のノイズが発生する原因となる。

【0007】排出部7内部の混練物に背圧を加えないようにするために、排出部7を取り外しシリンダー3より直接混練物を排出することが考えられる。しかし、最近のカラートナーにおいてはフルカラー化による付着量の増加、OHPにおける透光性の確保に対応するためにバインダー樹脂の低融点化が図られており、シリンダー3出口での混練物の粘度がかなり低くなっている。そのため、シリンダー3より直接混練物を排出してしまうと、落下の衝撃によりプレスローラ9上から混練物が飛び散ってしまったりしてしまうといった問題がある。

【0008】

【発明が解決しようとする課題】本発明は、上記事情に鑑みなされたものであって、バインダー樹脂中に添加剤を小径かつ均一に分散するとともに混練物をスムーズに次工程に搬送する混練押出装置及びバインダー樹脂中に

ワックスが小径かつ均一に分散したトナーの製造方法を提供することを目的としている。

【0009】

【課題を解決するための手段】上記目的を達成するために、本発明の混練押出装置は、バインダー樹脂と添加剤とからなる原材料を溶融混練するための混練押出装置において、前記原材料を混練搬送するための混練搬送部材を内部に有するシリンダー部の出口に下方傾斜した滑り台状の排出部が接続されていることを特徴としている。

【0010】また、本発明のトナーの製造方法は、少なくともバインダー樹脂、着色剤及びワックスを上述の混練押出装置を用いて混練する工程を有することを特徴としている。

【0011】この製造方法によれば、混練押出装置から排出される際に混練物に背圧が加わることがないので、混練物中のワックスが再凝集して粒径が大きくなることがない。従って、混練物の粉碎時にトナーと同様の粒径の遊離ワックスがトナー中に混在してしまい、感光体に付着して画像上にBS（ブラックスポット（黒点融着））及びフィルミング等のノイズが発生することがない。

【0012】さらに、シリンダーから排出されたかなり粘度の低い混練物を滑り台に沿ってスムーズにプレスローラへ導くことができるので、プレスローラ上で混練物が飛び散ったりすることがない。

【0013】

【発明の実施の形態】本発明の混練押出装置の一実施形態を以下に説明する。本実施形態の混練押出装置は、図2に示す従来型の排出部7を図3に示す下方傾斜した樋状の排出部10で置き換えたものである。

【0014】樋状排出部10は、シリンダー3の出口に設けられシリンダー3の開口断面と同形状の開口を有する取付ステイ11に対し下方に傾斜した状態で溶接されている。斜度はシリンダー3より搬送されてくる混練物がスムーズに滑り落ちる程度でかつ滑り落ちた混練物がプレスローラ9に突入する際衝撃により飛び散らない程度の斜度であれば特に限定されるものではない。30°～60°が妥当な値である。

【0015】樋状排出部10の内面には滑り性を良くするための表面処理が施されており、混練物が内面に付着せずスムーズに滑り落ちるようにしてある。耐熱性が重要なこと以外は特に限定されないが、テフロンコーティングが好ましい。

【0016】さらに混練物が付着しないようにするために、樋状排出部10の外面に冷却エアーを吹きつけるためのダクト12がその近傍に配置されているが、あまり冷却しすぎると混練物の粘度が高くなりスムーズにプレスローラ9に突入しなくなるので適温に温度調節する必要がある。混練物を排出させている状態で樋状排出部10の外表面温度を10～30℃に保つことが望ましい。冷

却手段は冷却エアーに限らず樋状排出部10の外面に配管を敷設し水をその中に通すことにより冷却するようにしてもよい。

【0017】樋状排出部10の断面は半円であり、取付ステイ11の開口部を覆うことができる程度の径に設定されている。樋状排出部10の径はシリンダー3より搬送されてくる混練物が樋状排出部10の外部に溢れ出さない程度であれば限定されるものではない。

【0018】混練物としては、あまり粘度が高すぎるとシリンダー3の出口で塊になってしまい樋状排出部10をつたって流れないので、流れる程度の粘度である必要がある。シリンダー3出口での溶融粘度が 4×10^4 poise以下であることが必要で、好ましくは 1×10^4 poise以下である。

【0019】本発明の混練装置を用いて混練するトナーの原材料としては、これに用いられるバインダー樹脂として105℃における見かけ溶融粘度が $1 \times 10^4 \sim 5 \times 10^6$ poise程度であるものが望ましく、特に低融点のバインダー樹脂を用いるフルカラートナーの原材料を混練するうえで適している。

【0020】なお、上記実施形態では排出部の形状を樋状にしたが、これに限らず図4に示すような角溝状にしてもよい。また、同図に示すように上蓋を取り付けてさらに混練物が溢れにくい形状にしてもよい。

【0021】

【実施例】まず、混練押出装置に投入するトナーの原材料の混合物を得るために、ポリエステル樹脂（見掛け溶融粘度が 1×10^5 poiseの時の温度105℃、見掛け溶融粘度が 1×10^5 poiseの時の温度95℃）とマゼンタ着色剤（大日本インキ化学工業社製：C. I. ピグメントレッド184）とを7：3の割合で加圧ニーダーに仕込み、これらを混練し、この混練物をフェザーミルで粉碎して顔料マスターバッチを得た。樹脂の溶融粘度を求めるにあたっては、フローテスター（島津製作所社製：CFT-500）を用いて測定した。測定する試料1.0gを秤量し、直径1.0mmφ×長さ1.0mmのノズルを用い、昇温速度3.0℃/min、予熱時間180秒、加重30kg、測定温度範囲60～140℃の条件で、上記フローテスターにより測定を行い、上記の試料における温度—見掛け粘度曲線から求めた。

【0022】そして、この顔料マスターバッチを10重量部、上記ポリエステル樹脂を93重量部、サリチル酸亜鉛錯体（オリエント化学工業社製：E-84）からなる荷電制御剤を2重量部、軟化点が140℃、酸価が3.5のポリプロピレン（三洋化成工業社製：ビスコール110TS）からなるワックスを2重量部の割合で、これらをヘンシェルミキサーで混合した。

【0023】得られた混合物を図2に示す従来の混練押出装置における排出部7を図3に示す下方傾斜した樋状

の排出部10で置き換えた混練押出装置に投入し混練を行った。

【0024】樋状排出部10は、シリンダー3の出口に設けられシリンダー3の開口断面と同形状の開口を有する取付ステイ11に対し下方に45°傾斜した状態で溶接されている。

【0025】混練物が樋状排出部10の内面に付着せずスムーズに滑り落ちるようにするために、樋状排出部10の内面にはテフロンコーティング（日本フッソ社製NF-820TFC）が施されるとともに、樋状排出部10の外周近傍には冷却エアを吹き付けるためのダクト12が設けられ、外面温度が20℃になるように温調制御されている。

【0026】混練物が樋状排出部10の外部に溢れ出さないようにするために、樋状排出部10の径は、取付ステイ11の開口部を覆うことができる程度に設定している。混練押出装置に投入された混合物はシリンダー3内を搬送されながら溶融混練され、ワックス等が樹脂中に均一に分散される。シリンダー3の出口に到達した混練物は樋状排出部10上へ排出されるが、排出部が従来のように先細に絞込まれていないので一度均一に樹脂中に分散されたワックスが再凝集するようなことがない。

【0027】シリンダー3出口での混練物の温度は約135℃その時の溶融粘度は約 5×10^3 であり、傾斜した樋状排出部10を十分滑り落ちる程度の低い粘度になっている。また、冷却エアダクト12により排出部10は適温に冷却されているので混練物は樋状排出部10の内面に付着することがない。その後、プレスローラ9で圧延されながら冷却される。

【0028】得られた混練物中のワックスの分散性を測定するために、混練物をクロロホルムに溶解して遠心分離した。そして、浮遊してきたワックスを収集し、電子顕微鏡を用いてその分散状態を撮影した。その写真を図5に示す。

【0029】比較例として、図2に示す従来の混練押出装置を用いて得られた混練物のワックスの分散状態の写真を図6に示す。実験方法は、図2の混練押出装置を用いる以外は上述の方法と同一である。

【0030】図5と図6の写真を比較すると明らかなように、本発明の混練押出装置を用いた方がワックスが細かく分散されていることがわかる。従って、本発明の混練押出装置によれば、混練物の粉碎時にトナーと同程度の粒径の遊離ワックスがトナー中に混在してしまい、感光体に付着して画像上にBS（ブラックスポット（黒点融着））及びフィルミング等のノイズが発生することがない。

【0031】

【発明の効果】以上詳述したように、この発明における混練押出装置においては、シリンダーから混練物を排出する際に混練物に背圧が加わることがないので、樹脂中に分散されているワックスが再凝集することがない。そのため、ワックスは樹脂中に細かく均一に分散されており、従って、混練物の粉碎時にトナーと同程度の粒径の遊離ワックスがトナー中に混在してしまい、感光体に付着して画像上にBS（ブラックスポット（黒点融着））及びフィルミング等のノイズが発生することがない。

【0032】また、シリンダーから排出されたかなり粘度の低い混練物を滑り台に沿ってスムーズにプレスローラへ導くことができるので、プレスローラ上で混練物が飛び散ったりすることがない。

【図面の簡単な説明】

【図1】従来の混練押出装置の概略図を示す。

【図2】従来の2軸混練押出装置の排出部近傍の上面断面図を示す。

【図3】本発明の混練押出装置の一実施形態を示す。

【図4】本発明の混練押出装置の他の実施形態を示す。

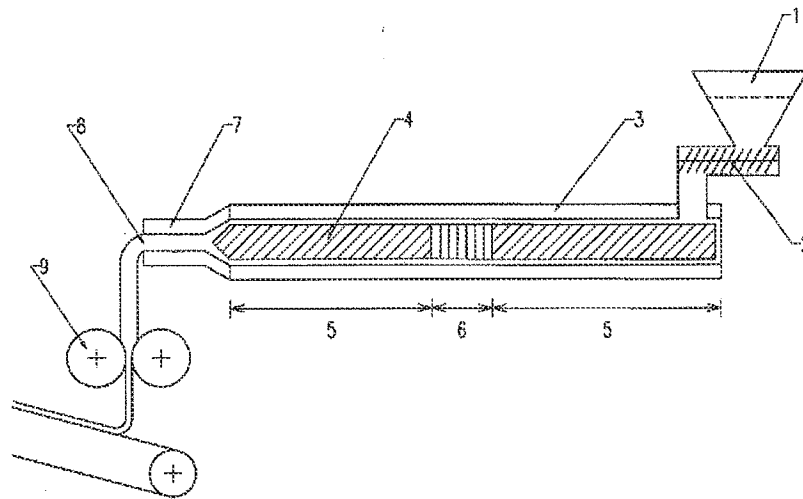
【図5】本発明の混練押出装置で得られたトナー混練物中のワックスの分散状態の電子顕微鏡写真（SEM写真）を示す。

【図6】従来の混練押出装置で得られたトナー混練物中のワックスの分散状態の電子顕微鏡写真（SEM写真）を示す。

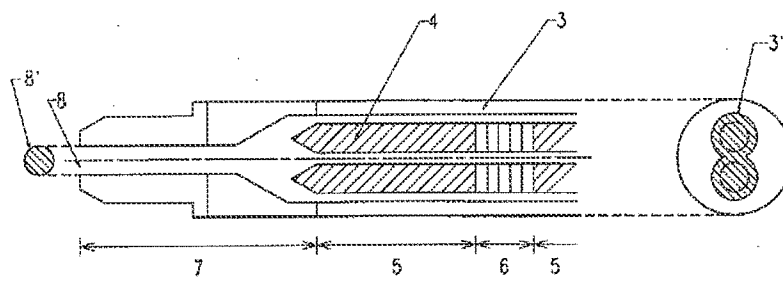
【符号の説明】

3：シリンダー、7：排出部、10：樋状排出部、12：冷却エアダクト

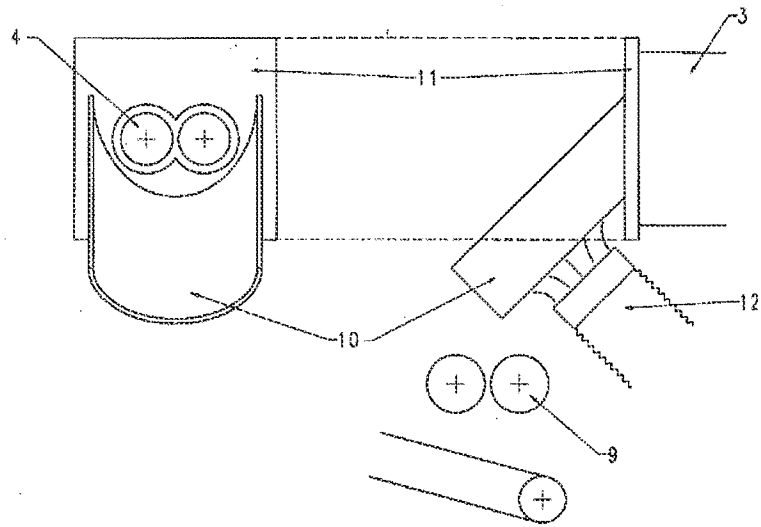
【図1】



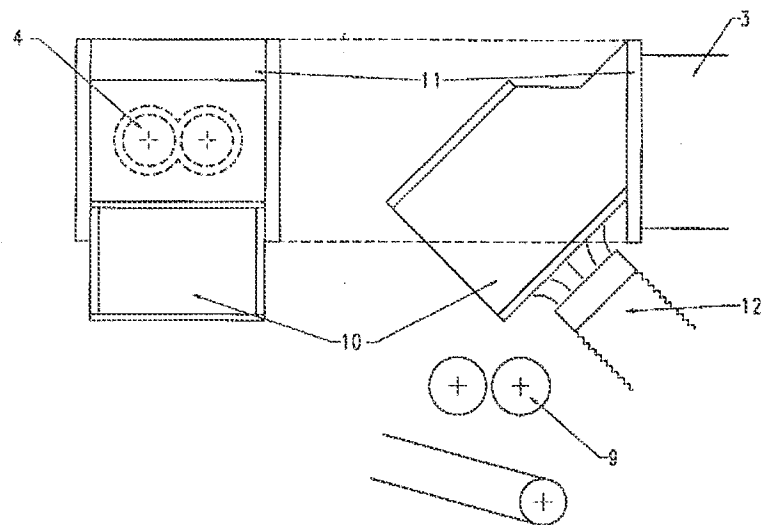
【図2】



【図3】

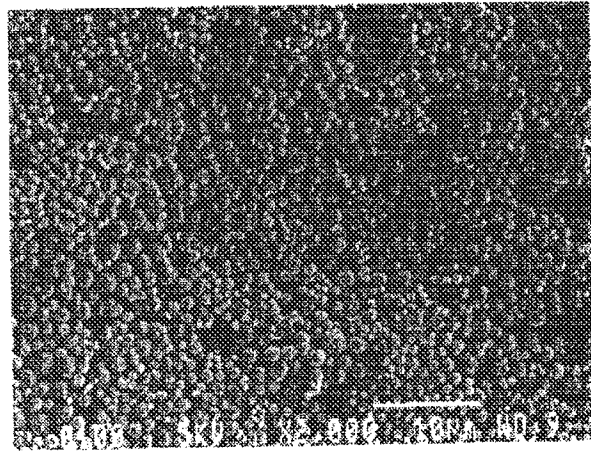


【図4】



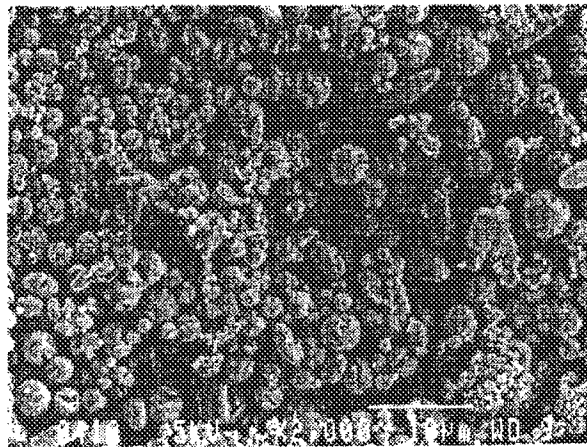
【図5】

図面代用写真



【図6】

図面代用写真



フロントページの続き

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